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of scientists can properly receive, understand and discuss such highly-specialized topics.

I am perfectly convinced, Mr. Secretary, that your complacent Pan-scientists would reject the recommendation *in parte et in toto*, but thinking men outside will agree that they should accept it, and be thankful!

JOS. W. RICHARDS

SCIENTIFIC BOOKS

Heredity and Environment in the Development of Men. By E. G. CONKLIN. Princeton University Press, 1915. Pp. xiv + 533, illustrated.

This book is based on a course of public lectures designed to present in non-technical terms a judicial view of eugenics as seen by a trained biologist. The author is particularly well qualified to undertake the task because of the breadth and depth of his biological knowledge, his own important contributions to several of the fields surveyed, his sound and well-balanced judgment, and his preeminent success as a teacher. He has succeeded remarkably well in a very difficult undertaking. For the lay reader can not fail to be interested in the wonderful array of post-Darwinian achievements in biology which are here marshalled in such a clear way; and the biologist familiar with the detailed discoveries to which mere reference is made by way of evidence or illustration, will profit much by the survey of a whole field in well-balanced perspective. The general reader, who gets from current literature quite contradictory and often distorted views as to the undertakings and the possibilities of the eugenics movement, will here find a correct and sane inventory of both.

The book is divided into six chapters, which deal with the following subjects:

I. Facts and factors of development. II. Cellular basis of heredity and development. III. Phenomena of inheritance. IV. Influence of environment. V. Control of heredity: Eugenics. VI. Genetics and ethics.

The conclusions reached in Chapter I. are concisely summed up thus: "... that every living thing in the world has come into existence by a process of development; that the entire human personality, mind as well as body,

has thus arisen; and that the factors of development may be classified as intrinsic in the organization of the germ cells, and extrinsic as represented in environmental forces and conditions. The intrinsic factors are those which are commonly called heredity, and they direct and guide development in the main; the extrinsic or environmental factors furnish the conditions in which development takes place and modify, more or less, its course."

In dealing with the "cellular basis of heredity and development" (Chap. II.) the author is most at home, for this is the field of his own special investigations. He emphasizes the conclusions that the germ-cells are the exclusive basis of inheritance and probably of sex determination and that their structure is "almost incredibly complex."

In dealing with the "phenomena of inheritance" (Chap. III.) the author presents a careful digest of present-day and orthodox Mendelism, including the pure-line theory and the consequent ineffectiveness of selection, the theory that all inheritance is due to recombination of Mendelian factors, even when blending results are obtained, and that Mendelian factors are devoid of variability. The presentation is a remarkably lucid one, but one suspects that, had the author been as familiar with the phenomena of inheritance as with their cellular basis, he would not have been content to explain the former as relatively simple and clear-cut while declaring the latter "almost inconceivably complex." There is no ground for thinking inheritance phenomena less complex than their cellular basis, for which reason theories which call for "pure gametes" and "pure lines" are likely to be short lived.

Chapter IV. presents some of the more striking results from the experimental study of development.

Chapter V. contains the familiar argument for eugenics (human reproduction controlled with a view to biological improvement of the race), viz., the differentially declining birth-rate, involving the more rapid increase of the poorer strains of humanity, with the recommendation that reproduction of the socially unfit be limited and that of the socially supe-

rior be encouraged. No new methods are suggested for securing these desirable ends, but an excellent statement is made of reasons why they should be sought.

Chapter VI. was originally written as a protest against eugenics of the more rabid sort, and even in its present somewhat modified form presents a rather strong contrast to the preceding chapter. It takes issue with the fatalistic, mechanistic, view of development, which would assign to heredity all the ills that flesh is heir to, and would deprive the individual of all ability to alter his career and character or to deviate from the course which fate had marked out for him in the constitution of his germ-plasm. This protest had at the time and still has occasion and utility. The book as a whole is an attempt to evaluate biologically heredity and environment, to show that both are indispensable, and accordingly that neither should be emphasized to the neglect of the other. In this *balanced view* of the two sets of agencies lies the peculiar merit of this excellent book.

W. E. CASTLE

SPECIAL ARTICLES

MAGNETIZATION BY ROTATION

ABOUT six years ago I published in this journal a note in which it was shown that on the modern theory of magnetism any magnetic substance should become magnetized by a sort of molecular gyroscopic process on being set into rotation. Rotation should produce in any substance an intrinsic magnetic intensity parallel to the axis of rotation, proportional to the angular velocity, and (like the magnetization of the earth) directed oppositely to the magnetic intensity which would be produced by an electric current circulating around the substance in the direction of rotation. If the rotating body is magnetic, magnetization, proportional to the intensity, should result; otherwise not (except to a very minute extent).

Preliminary experiments mentioned in the note referred to appeared, though doubtfully, to show the effect in question in the case of a large iron rod rotated at a speed of about 90 revolutions per second. Later observations

made in much the same way, but with an attempt at improvement in apparatus, failed to confirm this result with any certainty; and further investigation was postponed until better facilities were available.

Recently I have made, again with Mrs. Barnett's assistance, experiments which have yielded definite and conclusive results. In the final experiments two nearly similar rods of steel shafting were mounted with their axes horizontal and perpendicular to the magnetic meridian, and two similar coils of insulated wire were mounted about their centers. These coils were connected in series with one another and with a Grassot fluxmeter, and were oppositely wound so that any variations in the intensity of the earth's field produced no effect on the fluxmeter. One of the rods remained at rest; while the other, mounted in a region in which the earth's magnetic intensity was compensated by an electric current flowing in a very large coil, was alternately rotated by an air motor and brought to rest, the change of flux for different speeds and different directions of rotation being determined by the fluxmeter. The fluxmeter was compensated for extraneous electromotive forces, and was read by mirror and scale to 0.1 mm. at the scale distance 8 meters. After all suspected sources of systematic error were eliminated, an effect was left corresponding precisely with that predicted by the above theory and inexplicable on any other theory hitherto proposed. The intrinsic magnetic intensity of rotation per unit speed, and the change of flux-density at the center of the iron rod per unit speed, were found to be 3.1×10^{-7} gauss/r.p.s. and 1.9×10^{-5} maxwells/cm.² per r.p.s., respectively.

From experiments made for a different purpose by Lebedew in 1912 it can be shown that in non-magnetic substances not more than a minute fraction of the magnetization we have observed in iron is produced at the same speed.

It is not, of course, possible to obtain iron rods entirely free from magnetization, and observations were always made on changes of residual flux. Together with the change of flux proportional to the angular velocity, the